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**REMARKS**

In view of the following discussion, the Applicants submit that none of the claims now pending in the application are unpatentable under the provisions of 35 U.S.C. §103. Thus, the Applicants believe that all of these claims are now in allowable form.

**I. REJECTION OF CLAIMS 1 AND 12-23 UNDER 35 U.S.C. § 103****1. Claim 1**

Claim 1 stands rejected under 35 U.S.C. §103(a) as being unpatentable over the Yanosy patent application (United States Patent Application Publication No. 2003/0217128, published November 20, 2003, hereinafter "Yanosy") in view of the Chau et al. patent (United States Patent No. 5,764,750, issued June 9, 1998, hereinafter "Chau"). In response, the Applicants have amended independent claim 1 in order to more clearly recite aspects of the present invention.

Particularly, the Applicants respectfully direct the Examiner's attention to the fact that the alleged combination (as taught by Yanosy) fails to teach or suggest the novel invention of providing communication support for collaborative applications by forming a communication overlay tree that provides communication links between application server resources and users, via a middleware level, where the communication overlay tree comprises a first set of one or more nodes representing the application server resources, a second set of one or more nodes representing the users, a third set of one or more nodes representing middleware residing at the middleware level, and a fourth set of one or more nodes for clustering the nodes representing the application server resources into a first set of groups and the nodes representing the plurality of users into a second set of groups, such that communications from the first or second groups are routed via a single one of the communication links to the nodes representing middleware, as claimed in Applicants' independent claim 1.

The Examiner acknowledges that Yanosy fails to teach these features (Office Action, Pages 3-4); however, the Examiner submits that Chau bridges this gap in the teachings of Yanosy. The Applicants respectfully disagree.

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Although Chau teaches the use of a signaling overlay on top of an underlying network architecture, the structure of this signaling overlay is very different from the hierarchical structure of the overlay tree claimed by the Applicants. Specifically, the claimed invention implements an overlay tree that comprises a plurality of different sets of nodes for each of the user, applications, and middleware, where clustering creates groups of nodes representing users and different groups of nodes representing applications. By contrast, Chau teaches middleware that group "parties" and "services" into a single "cyberplace" or "context." In other words, users and applications are clustered together in Chau, rather than clustered into separate groups as claimed by the Applicants. Moreover, Chau does not appear to represent each user, application, or middleware component with a separate node, since, as discussed above, such components are clustered together into contexts.

As discussed in the Applicant's published Specification in at least paragraph [0034] and in FIG. 4, the Applicants represent applications resources, users, and middleware components as individual nodes in a communication overlay tree. The structure of this overlay tree is hierarchical in that additional nodes are used to cluster together either multiple application resources or multiple users. In this way, communications to and from groups of applications resources or groups of users can be routed over a single communication link.

Notably, the Applicants positively claim a method and system for providing communication support for collaborative applications in which a communication overlay tree provides communication links between application server resources and users, via a middleware level, and the communication overlay tree comprises a first set of one or more nodes representing the application server resources, a second set of one or more nodes representing the users, a third set of one or more nodes representing middleware residing at the middleware level, and a fourth set of one or more nodes for clustering the nodes representing the application server resources into a first set of groups and the nodes representing the plurality of users into a second set of groups, such that communications from the first or second groups are routed via a single one of the communication links to the nodes representing middleware. Specifically, Applicants'

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independent claim 1 positively recites:

1. A method of providing communication support for collaborative applications comprising:
  - abstracting a network and application server resources at a middleware level;
  - indexing the application server resources in a network aware and application aware manner to reflect positions of the application server resources in an application space;
  - indexing a plurality of users to reflect communication interests of the plurality of users in the application space; and
  - forming a communication overlay tree that provides communication links between the application server resources and the plurality of users, via the middleware level, the communication overlay tree comprising a first set of one or more nodes representing the application server resources, a second set of one or more nodes representing the plurality of users, a third set of one or more nodes representing middleware residing at the middleware level, and a fourth set of one or more nodes for clustering said one or more nodes representing the application server resources into a first set of one or more groups and for clustering the one or more nodes representing the plurality of users into a second set of one or more groups different from the first set of one or more groups, such that communications from said first set of one or more groups or from said second set of one or more groups are routed via a single one of the communication links to one of the one or more nodes representing middleware. (Emphasis added)

As discussed above, neither Yanosy nor Chau teaches or suggests the novel invention of providing communication support for collaborative applications by forming a communication overlay tree that provides communication links between application server resources and users, via a middleware level, where the communication overlay tree comprises a first set of one or more nodes representing the application server resources, a second set of one or more nodes representing the users, a third set of one or more nodes representing middleware residing at the middleware level, and a fourth set of one or more nodes for clustering the nodes representing the application server resources into a first set of groups and the nodes representing the plurality of users into a second set of groups, such that communications from the first or second groups are

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routed via a single one of the communication links to the nodes representing middleware, as claimed by the Applicants' independent claim 1. Accordingly, the Applicants respectfully submit that independent claim 1 is not unpatentable over the teachings of Yanosy in view of Chau. As such, the Applicants respectfully request that the rejection of claim 1 under 35 U.S.C. §103(a) be withdrawn.

## 2. Claims 12-23

Claims 12-23 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Yanosy in view of Chau and further in view of the Garcia-Luna-Aceves et al. patent application (United States Patent Application Publication No. 2003/0101278, published May 29, 2003, hereinafter "Garcia-Luna-Aceves"). In response, the Applicants have amended independent claims 12 and 18 in order to more clearly recite aspects of the invention.

As discussed above, Yanosy in view of Chau fails to teach or suggest the novel invention of providing communication support for collaborative applications by forming a communication overlay tree that provides communication links between application server resources and users, via a middleware level, where the communication overlay tree comprises a first set of one or more nodes representing the application server resources, a second set of one or more nodes representing the users, a third set of one or more nodes representing middleware residing at the middleware level, and a fourth set of one or more nodes for clustering the nodes representing the application server resources into a first set of groups and the nodes representing the plurality of users into a second set of groups, such that communications from the first or second groups are routed via a single one of the communication links to the nodes representing middleware, as claimed in Applicants' independent claims 12 and 18. Garcia-Luna-Aceves fails to bridge this gap in the teachings of Yanosy and Chau. At best, Garcia-Luna-Aceves teaches that clients are mapped to servers based on network latency (*i.e.*, a "most favored server" is specified for each client). Garcia-Luna-Aceves clearly does not teach that this network latency map has a hierarchical structure (*e.g.*, such as that of

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an overlay tree having the claimed structure).

Notably, the Applicants positively claim a method and system for providing communication support for collaborative applications in which a communication overlay tree provides communication links between application server resources and users, via a middleware level, and the communication overlay tree comprises a first set of one or more nodes representing the application server resources, a second set of one or more nodes representing the users, a third set of one or more nodes representing middleware residing at the middleware level, and a fourth set of one or more nodes for clustering the nodes representing the application server resources into a first set of groups and the nodes representing the plurality of users into a second set of groups, such that communications from the first or second groups are routed via a single one of the communication links to the nodes representing middleware. In particular, Applicants' independent claims 12 and 18, as amended, positively recite:

12. A method of virtualizing network resources to support collaborative communications in a network having application servers and users that have communication interests, the method comprising the steps of:
  - constructing a scalable network map;
  - indexing the application servers according to positions of the application servers in the network;
  - indexing the users according to communication interests of the users;
  - generating a communication overlay tree based on the indexing of the application servers, on the indexing of the users, and on the scalable network map, the communication overlay tree comprising a first set of one or more nodes representing the application servers, a second set of one or more nodes representing the users, and a third set of one or more nodes for clustering said one or more nodes representing the application servers into a first set of one or more groups and for clustering the one or more nodes representing the users into a second set of one or more groups different from the first set of one or more groups, such that communications between said first set of one or more groups and said second set of one or more groups are routed via communication links; and
  - supporting communications between the application servers and the users over the communication overlay tree. (Emphasis added)

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18. A method of operating a communication network, comprising the steps of:

- identifying a plurality of network resources and network constraints of the plurality of network resources;
- identifying a plurality of application servers that are controlled by an application having an application space;
- identifying a plurality of users and a communication interest in the application space of each of said plurality of users; and
- indexing the plurality of application servers to reflect positions of the plurality of application servers in an attribute space;
- indexing said plurality of users according to identified communication interests;
- forming a user index identifier for each of said plurality of users;

and

establishing a communication overlay tree between the plurality of application servers and the plurality of users based on the network constraints and on the plurality of users as indexed, the communication overlay tree providing communication links between the plurality of application servers and the plurality of users, the communication overlay tree comprising a first set of one or more nodes representing the plurality of application servers, a second set of one or more nodes representing the plurality of users, and a third set of one or more nodes for clustering said one or more nodes representing the plurality of application servers into a first set of one or more groups and for clustering the one or more nodes representing the plurality of users into a second set of one or more groups different from the first set of one or more groups, such that communications between said first set of one or more groups and said second set of one or more groups are routed via the communication links. (Emphasis added)

As discussed above, Yanosy, Chau, and Garcia-Luna-Aceves fail, singly or in any permissible combination, to teach or suggest the novel invention of providing communication support for collaborative applications by forming a communication overlay tree that provides communication links between application server resources and users, via a middleware level, where the communication overlay tree comprises a first set of one or more nodes representing the application server resources, a second set of one or more nodes representing the users, a third set of one or more nodes representing middleware residing at the middleware level, and a fourth set of one or more nodes for clustering the nodes representing the application server resources into a first set of groups and the nodes representing the plurality of users into a second set of

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groups, such that communications from the first or second groups are routed via a single one of the communication links to the nodes representing middleware, as claimed by the Applicants' independent claims 12 and 18. Accordingly, the Applicants respectfully submit that independent claims 12 and 18 are not made obvious by the teachings of Yanosy in view of Chau and further in view of Garcia-Luna-Aceves.

Claims 13-17 and 19-23 depend, directly or indirectly, from claims 12 and 18 and recite additional features. As such, and at least for the reasons stated above, the Applicants respectfully submit that claims 13-17 and 19-23 are also not made obvious by the teachings of Yanosy in view of Chau and further in view of Garcia-Luna-Aceves. As such, the Applicants respectfully request that the rejection of claims 12-23 under 35 U.S.C. §103(a) be withdrawn.

## **II. CONCLUSION**


Thus, the Applicants submit that all of the presented claims fully satisfy the requirements of 35 U.S.C. §103. Consequently, the Applicants believe that all of the presented claims are presently in condition for allowance. Accordingly, both reconsideration of this application and its swift passage to issue are earnestly solicited.

If, however, the Examiner believes that there are any unresolved issues requiring the issuance of a final action in any of the claims now pending in the application, it is requested that the Examiner telephone Mr. Kin-Wah Tong, Esq. at (732) 530-9404 so that appropriate arrangements can be made for resolving such issues as expeditiously as possible.

Respectfully submitted,

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Date

  
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